







# A Practical Guide for Assessment of Skin Burden in Patients With Psoriatic Arthritis

Fazira R. Kasiem<sup>1</sup> , Annelieke Pasma<sup>1</sup>, Jolanda J. Luime<sup>1</sup> , Ilja Tchetverikov<sup>2</sup>, Kim Wervers<sup>1</sup> ,  
Lindy-Anne Korswagen<sup>3</sup>, Natasja Denissen<sup>4</sup>, Yvonne P.M. Goekoop-Ruiterman<sup>5</sup>,  
Maikel van Oosterhout<sup>6</sup>, Faouzia Fodili<sup>7</sup>, Johanna M.W. Hazes<sup>1</sup>, Martijn B.A. van Doorn<sup>8</sup> ,  
Marc R. Kok<sup>9</sup> , and Marijn Vis<sup>1</sup> , on behalf of CICERO

**ABSTRACT. Objective.** Rheumatologists play a pivotal role in the management of patients with psoriatic arthritis (PsA). Due to time constraints during clinic visits, the skin may not receive the attention needed for optimal patient outcome. Therefore, the aim of this study was to select a set of core questions that can help rheumatologists in daily rheumatology clinical practice to identify patients with PsA with a high skin burden.

**Methods.** Baseline data from patients included in the Dutch South West Psoriatic Arthritis (DEPAR) cohort were used. Questions were derived from the Skindex-17 and Dermatology Life Quality Index (DLQI) questionnaires. Underlying clusters of questions were identified with an exploratory principal component analysis (PCA) with varimax rotation, after which a 2-parameter logistic model was fitted per cluster. Questions were selected based on their discrimination and difficulty. Subsequently, 2 flowcharts were made with categories of skin burden severity. Clinical considerations were specified per category.

**Results.** In total, 413 patients were included. The PCA showed 2 underlying clusters: a psychosocial domain and a domain assessing physical symptoms. We selected these 2 domains. The psychosocial domain contains 3 questions and specifies 4 categories of skin burden severity. The physical symptoms domain contains 2 questions and categorizes patients in 1 out of 3 categories.

**Conclusion.** We have selected a set with a maximum of 5 questions that rheumatologists can easily implement in their consultation to assess skin burden in patients with PsA. This practical guide makes the assessment of skin burden more accessible to rheumatologists and can aid in clinical decision making.

**Key Indexing Terms:** arthritic psoriasis, psoriasis, quality of life

Psoriatic arthritis (PsA) is a chronic rheumatic disease that involves inflammation in joints, entheses, and the skin.<sup>1</sup> PsA has a broad impact on Health-Related Quality of Life (HRQOL), affecting both physical and emotional aspects of a patient's life, such as participation, level of fatigue, and sleep.<sup>2</sup> In a previous study, we showed that in patients with PsA, general HRQOL is affected mainly by pain.<sup>3</sup> However, this does not mean that

psoriasis (PsO) is not important in patients with PsA. Studies of patients with PsO have shown that PsO negatively affects HRQOL.<sup>3,4</sup> It is important to note that it is not only the surface area and severity of skin involvement that play a role in its impact. Patients with PsO affecting less common areas are disproportionately affected, relative to the surface area of their PsO.<sup>5</sup> Visible PsO, such as lesions on the face, hands, and palms, or lesions in intimate areas, such as the intertriginous regions, cause patients to feel ashamed, embarrassed, and/or self-conscious.<sup>6</sup> Combined with the social stigma of having such a skin disease, patients are more prone to developing elevated levels of anxiety, depression, low self-esteem, and even suicidal thoughts.<sup>7</sup>

Rheumatologists play an important role in the management of both musculoskeletal and cutaneous inflammation in patients with PsA. It can sometimes be challenging for rheumatologists to assess the effect of psoriatic skin symptoms, in addition to the various musculoskeletal disease manifestations. However, it is important to assess skin burden of patients with PsA for a number of reasons. First, the impact of PsO may affect the choice of treatment. It is known that some biologics are better than others in treating skin symptoms. For instance, interleukin (IL)-17 inhibitors are superior to tumor necrosis factor blockers in improving PsO, as has recently been shown in 2 head-to-head trials.<sup>8-10</sup> Second, achieving minimal disease activity (MDA) is important

<sup>1</sup>F.R. Kasiem, MD, A. Pasma, PhD, J.J. Luime, PhD, K. Wervers, MD, PhD, J.M.W. Hazes, MD, PhD, Professor, M. Vis, MD, PhD, Department of Rheumatology, Erasmus Medical Center, Rotterdam; <sup>2</sup>I. Tchetverikov, MD, PhD, Department of Rheumatology, Albert Schweitzer Hospital, Dordrecht; <sup>3</sup>L.A. Korswagen, MD, Department of Rheumatology, Franciscus Gasthuis & Vlietland, Rotterdam; <sup>4</sup>N. Denissen, MD, Department of Rheumatology, Amphia Hospital, Breda; <sup>5</sup>Y.P.M. Goekoop-Ruiterman, MD, PhD, Haga Hospital, Department of Rheumatology, The Hague; <sup>6</sup>M. van Oosterhout, MD, Department of Rheumatology, Groene Hart Ziekenhuis, Rotterdam; <sup>7</sup>F. Fodili, MD, Department of Rheumatology, Reumazorg Zuid West Nederland, Roosendaal; <sup>8</sup>M.B.A. van Doorn, MD, PhD, Department of Dermatology, Erasmus Medical Center, Rotterdam; <sup>9</sup>M.R. Kok, MD, PhD, Department of Rheumatology and Clinical Immunology, Maastad Hospital, Rotterdam, the Netherlands.

The authors declare no conflicts of interest relevant to this article.

Address correspondence to Dr. F.R. Kasiem, Doctor Molewaterplein 40, 3015 GD Rotterdam, the Netherlands. Email: f.kasiem@erasmusmc.nl.

Accepted for publication May 17, 2022.

in the treatment of PsA, and residual skin activity may prevent patients from reaching MDA. In a study by van Mens et al, 47% of patients with PsA still had active skin as one of the features preventing them from achieving MDA.<sup>11</sup> In addition, 23% of patients who reached MDA still had residual skin disease.<sup>11</sup> Last, the current severity measures of PsO do not take into account the impact of the location of the PsO lesions. Locations such as the face, intertriginous areas, and genitals may add little to severity through body surface area, scaling, induration, and redness, but can add a lot to skin burden itself.<sup>5</sup> Adding to this problem is the fact that patients often feel uncomfortable discussing their skin burden with healthcare professionals.<sup>7</sup> These arguments highlight the need for rheumatologists to be aware of the burden that PsO may cause and the need for discussing this matter with their patients.

Previously, we have shown that a negative effect of PsO severity on HRQOL was seen only in a dermatology-specific HRQOL questionnaire and not in a general HRQOL questionnaire. This means that in order for rheumatologists to adequately assess dermatology-specific HRQOL in patients with PsA, specific questions on skin symptoms are necessary.<sup>3,12</sup>

Two questionnaires that are often used for assessment of dermatology-specific HRQOL are the Dermatology Life Quality Index (DLQI) and Skindex-17.<sup>13,14</sup> The DLQI consists of 10 questions, which patients answer on a Likert scale. The DLQI sum score ranges from 0 to 30 and higher scores reflect greater HRQOL impairment.<sup>13</sup> The Skindex-17 was developed by Nijsten et al by reducing the Skindex-29 using a Rasch analysis.<sup>14</sup> This questionnaire consists of 17 questions, which patients have to answer on a 5-point Likert scale. The Skindex-17 generates 2 dermatology-specific HRQOL scores based on 2 subscales: a symptoms subscale and a psychosocial subscale.<sup>14</sup>

In daily clinical practice, both patients with PsA and rheumatologists face certain time constraints, making it challenging for patients to fill out a complete questionnaire and for rheumatologists to assess it during each visit. However, it remains important for rheumatologists to adequately address dermatology-specific HRQOL in PsA. Therefore, the aim of this study was to select a set of core questions that can help rheumatologists in daily rheumatology clinical practice to identify patients with PsA with a high skin burden.

## METHODS

**Patients and setting.** Data from patients with PsA receiving usual care were used from the Dutch South West Psoriatic Arthritis (DEPAR) cohort. The DEPAR cohort is a real-world inception cohort in which patients with PsA, newly diagnosed by their rheumatologist, are included. The study design of this cohort has been described elsewhere.<sup>15</sup> Baseline data from patients included between July 2013 and March 2020 were used. The DEPAR study was approved by the local medical research ethics committee of the University Medical Center Rotterdam (MEC-2012-549) and written informed consent was obtained for all study participants according to the Declaration of Helsinki.

**Dermatology-specific questionnaires.** The 2 dermatology-specific HRQOL questionnaires used were the DLQI and the Skindex-17.<sup>13,14</sup> The DLQI is a 10-item questionnaire that was developed for routine clinical use in dermatology clinics to measure the impact of patients' skin disease. Each question has 5 alternative response options: "very much," "a lot," "a little," "not at all,"

and "not relevant," except for question 7a, which has to be answered with yes or no. The 10 questions can be grouped under 6 headings, namely symptoms/feelings, daily activities, leisure, work/school, personal relationships, and treatment. The maximum score is 30, with a higher score indicating greater impairment of HRQOL.<sup>13</sup>

The Skindex-17 is a dermatology-specific HRQOL instrument that constitutes 2 subscales with separate summing scores: a psychosocial subscale and symptoms subscale. The questionnaire contains 17 items, which patients answer on a 5-point graded Likert scale: "never," "rarely," "sometimes," "often," and "always." The psychosocial subscale ranges from 0 to 24 and the symptoms subscale ranges from 0 to 10, with a higher score indicating greater impairment and more symptoms, respectively.<sup>14</sup>

In the present study, patients filled in the Dutch version of both questionnaires. For construction of the guide, the validated English questions were used. Both the DLQI and Skindex-17 questionnaires are copyrighted. Permission was given by Cardiff University for the use of the DLQI in this research. The DLQI and the individual questions of the DLQI are copyrighted [© Finlay AY and G K Khan, April 1992].<sup>13</sup> Permission for the use of the Skindex-17 was obtained from Nijsten et al.<sup>14</sup>

**Statistical analysis.** To assess which questions were most relevant for the practical guide, we used item response theory-based modeling. Data of patients with a completed DLQI and Skindex-17 at baseline were used. We opted for a baseline sample because at this timepoint, patients had the most heterogeneous Psoriasis Area and Severity Index (PASI) scores. For the analysis, answering the DLQI with the option "not relevant" was considered as missing, because this indicated that the question did not apply to the particular respondent. By doing so, we avoided interference in the interpretation of the scores.

First, an exploratory principal component analysis (PCA) with varimax rotation was performed on both questionnaires combined. We additionally made a scree plot and evaluated the eigenvalues of each item to determine the amount of underlying clusters (latent traits). Subsequently, items were dichotomized on their median frequencies. A 2-parameter logistic (2PL) model was then fitted for each latent trait. We opted for a 2PL model because we wanted to make each item discriminative on the difficulty level. This model assumes monotonicity, unidimensionality, invariance, local independence, and a qualitatively homogeneous population. Item characteristic curves were subsequently plotted for each latent trait to visualize the level of discrimination and difficulty per item. Item selection then took place based on the discrimination and difficulty of the items. Per latent trait, we selected 2 to 3 items distributed far apart across the latent trait. Analyses were performed in Stata 16.0 (StataCorp).

**Practical guide.** For easy application in daily practice, we constructed a flowchart with the selected questions. In this flowchart, the questions were arranged in chronological order, namely those with a lower difficulty level first. Based on the answers, categories of skin burden severity were specified. Per category of skin burden severity, we formulated several clinical considerations. These were developed with the help of a dermatologist (MBAvD) and were based on the Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPPA) treatment guidelines.<sup>16</sup>

## RESULTS

**Study population.** In total, 413 patients had complete data for both the Skindex-17 and DLQI questionnaires at baseline (Table 1). Mean (SD) age was 50.3 (13.4) years and 50% (n = 205) of patients were male. The median (IQR) PASI score was 2.0 (0.5-4.2) and patients had a median (IQR) of 2.0 (0.0-4.0) swollen and 3.0 (1.0-7.0) tender joints. General HRQOL, measured with the 36-item Short Form Health Survey, showed a mean (SD) score of 39.2 (8.4) on the physical component summary scale and a median (IQR) score of 49.4 (40.7-55.8) on the mental component summary scale. On

Table 1. Baseline characteristics of patient sample (n = 413).

	Total
Demographic characteristics	
No. of patients, n (%)	413 (100)
Age, yrs, mean (SD)	50.3 (13.4)
Male, n (%)	205 (49.6)
Psoriasis complaints preceding PsA diagnosis, yrs <sup>a</sup>	10.0 (3.1-21.0)
Duration of joint complaints, months <sup>b</sup>	10.6 (3.8-32.6)
Clinical characteristics	
PASI <sup>c</sup>	2.0 (0.5-4.2)
SJC66 <sup>c</sup>	2.0 (0.0-4.0)
TJC68 <sup>c</sup>	3.0 (1.0-7.0)
DAPSA <sup>d</sup>	16.0 (10.1-23.3)
HRQOL	
General	
SF-36	
PCS, mean (SD)	39.2 (8.4)
MCS	49.4 (40.7-55.8)
Dermatology-specific	
VAS psoriasis <sup>c</sup>	21.0 (5.0-47.0)
Skindex-17	
Symptoms	4.0 (2.0-6.0)
Psychosocial	1.0 (0.0-8.0)
DLQI	1.0 (0.0-5.0)

Values are expressed as median (IQR) unless indicated otherwise. <sup>a</sup> 43 missing, <sup>b</sup> 4 missing, <sup>c</sup> 1 missing, <sup>d</sup> 85 missing, <sup>e</sup> 3 missing. DAPSA: Disease Activity Index for Psoriatic Arthritis; DLQI: Dermatology Life Quality Index; HRQOL: health-related quality of life; MCS: mental component summary; PASI: Psoriasis Area and Severity Index; PCS: physical component summary; PsA: psoriatic arthritis; SF-36: 36-item Short Form Health Survey; SJC66: 66-joint swollen joint count; TJC68: 68-joint tender joint count; VAS: visual analog scale.

the symptoms subscale and the psychosocial subscale of the Skindex-17, patients had a median (IQR) score of 4.0 (2.0-6.0) and 1.0 (0.0-8.0), respectively. Patients had a median (IQR) DLQI score of 1.0 (0.0-5.0).

**2PL model.** The PCA gave the best fit with 2 underlying clusters of questions, namely questions regarding psychosocial impact (n = 20) and questions regarding physical symptoms (n = 7). Factor loadings ranged from 0.009 to 0.276 in the psychosocial cluster (cluster 1) and from 0.003 to 0.455 in the physical symptoms cluster (cluster 2), indicating the strength with which an item loaded on each cluster. A 2PL model was then fitted per cluster. Table 2 gives an overview of the selection of items from the 2PL model per latent trait. In the 2PL model of cluster 1, 3 questions had the best discrimination across increasing difficulty level. In cluster 2, 2 questions possessed these qualities.

**Practical guide.** Three questions were selected to assess psychosocial impact and 2 questions to assess impact of physical symptoms. We specified 4 categories of skin burden severity in the psychosocial cluster and 3 categories in the cluster of physical symptoms. For each category within these clusters, clinical considerations are shown (Figure). Rheumatologists have to instruct patients on the answering options and 1-week recall period beforehand, meaning that the answers should be based on the patient's experiences 1 week prior to their clinical visit.

Also, some items are posed as statements and others as questions. The reason for this is that items from the Skindex-17 are posed as statements from the perspective of the patient, whereas items from the DLQI are posed as questions asked by the physician.

**Cluster 1: psychosocial.** The psychosocial cluster divides patients' skin burden into 4 categories based on the severity of psychosocial burden stemming from the skin. The first question asks if the patient is embarrassed by their skin condition. If they answer with "never," the patient falls into category 1. If they answer with "rarely/sometimes" or "often/always," continue to the second question. Ask the patient if they tended to stay at home because of their skin condition. If they answer with "never," they fall into category 2. If they answer with "rarely/sometimes" or "often/always," continue to the last question. Ask the patient if their skin condition has prevented them from working or studying. If not, the patient falls into category 3 and if they answer yes, they fall into category 4.

**Cluster 2: physical complaints.** The physical symptoms cluster divides patients' skin burden into 3 categories based on the severity of burden stemming from physical PsO symptoms. First, ask the patient how itchy, sore, painful, or stinging their skin has been. If they answer with "not at all," they fall into category 1. If they answer with "a little/a lot/very much," continue to the second question. Ask if their skin is irritated. If they answer with "never/rarely/sometimes," they fall into category 2. If they answer with "often/always," the patient falls into category 3 and experienced the highest burden in this domain.

Patient characteristics per category of skin burden are shown in Table 3. With the 2PL model of the psychosocial cluster at baseline, 93% (n = 384/413) of the patients in our sample could be categorized to 1 of the 4 categories. At 12 months, 96% (n = 253/263) could be categorized. In the physical symptoms cluster, this was 100% at both baseline and 12 months. At baseline, the majority of patients fell into category 1 within the psychosocial cluster (n = 220; 57%) and category 3 within the physical symptoms cluster (n = 265; 64%). Median PASI score, Skindex-17 scores of both subscales, and DLQI score increased with increasing category of skin burden.

## DISCUSSION

The aim of this study was to select a set of core questions that rheumatologists can easily implement in daily practice to assess skin burden in patients with PsA. With a minimum of 2 and a maximum of 5 questions, both the psychosocial burden of the skin and burden of physical skin symptoms can be identified. The practical guide will function as a tool for the rheumatologist to start the dialogue with their patients on skin burden, and the clinical considerations will subsequently aid in clinical decision making.

This practical guide contains 2 domains of skin burden: a psychosocial domain and a physical symptoms domain. Addressing psychosocial impact of the skin is important in patients with PsA, especially in the case of PsO located in difficult (to treat) areas, such as private parts or the hands and face.<sup>7</sup> This may not run in parallel with objective scores, such as the PASI, and may be easily overlooked otherwise. We recommend



Table 2. Selection of items from the 2-parameter logistic (2PL) models per latent trait.

Latent Trait	Item	Question	Discrimination	Difficulty
Psychosocial	<b>Skindex-17 no. 12</b>	<b>I am embarrassed by my skin condition</b>	<b>5.956</b>	<b>0.209</b>
	Skindex-17 no. 13	I am frustrated by my skin condition	5.738	0.280
	Skindex-17 no. 3	My skin condition affects my social life	4.677	0.418
	Skindex-17 no. 4	My skin condition makes me feel depressed	4.911	0.522
	Skindex-17 no. 2	My skin condition makes it hard to work or do hobbies	3.181	0.551
	Skindex-17 no. 7	My skin condition affects how close I can be with those I love	4.608	0.622
	DLQI no. 2	Over the last week, how embarrassed or self conscious have you been because of your skin?	3.156	0.658
	Skindex-17 no. 17	My skin condition interferes with my sex life	3.686	0.710
	Skindex-17 no. 10	My skin condition makes showing affection difficult	5.952	0.786
	Skindex-17 no. 14	My skin condition affects my desire to be with people	9.837	0.798
	Skindex-17 no. 15	I am humiliated by my skin condition	5.536	0.834
	Skindex-17 no. 8	I tend to do things by myself because of my skin condition	6.236	0.853
	<b>Skindex-17 no. 5</b>	<b>I tend to stay at home because of my skin condition</b>	<b>5.613</b>	<b>0.923</b>
	DLQI no. 4	Over the last week, how much has your skin influenced the clothes you wear?	1.543	0.977
	DLQI no. 3	Over the last week, how much has your skin interfered with you going shopping or looking after your home or garden?	2.793	1.051
	DLQI no. 9	Over the last week, how much has your skin caused any sexual difficulties?	3.337	1.087
	DLQI no. 5	Over the last week, how much has your skin affected any social or leisure activities?	3.230	1.090
	DLQI no. 6	Over the last week, how much has your skin made it difficult for you to do any sport?	2.502	1.137
	DLQI no. 7b	If "No", over the last week how much has your skin been a problem at work or studying?	1.799	1.405
	DLQI no. 8	Over the last week, how much has your skin created problems with your partner or any of your close friends or relatives?	2.682	1.405
	<b>DLQI no. 7a</b>	<b>Over the last week, has your skin prevented you from working or studying?</b>	<b>-3.426</b>	<b>2.064</b>
Physical symptoms	Skindex-17 no. 16	My skin condition bleeds	2.093	0.108
	Skindex-17 no. 1	My skin hurts	2.460	-0.251
	<b>DLQI no. 1</b>	<b>Over the last week, how itchy, sore, painful or stinging has your skin been?</b>	<b>4.462</b>	<b>-0.468</b>
	Skindex-17 no. 6	My skin itches	3.032	0.499
	Skindex-17 no. 9	Water bothers my skin condition (bathing, washing hands)	1.662	0.573
	<b>Skindex-17 no. 11</b>	<b>My skin is irritated</b>	<b>3.609</b>	<b>0.620</b>
	DLQI no. 10	Over the last week, how much of a problem has the treatment for your skin been, for example by making your home messy, or by taking up time?	1.611	0.973

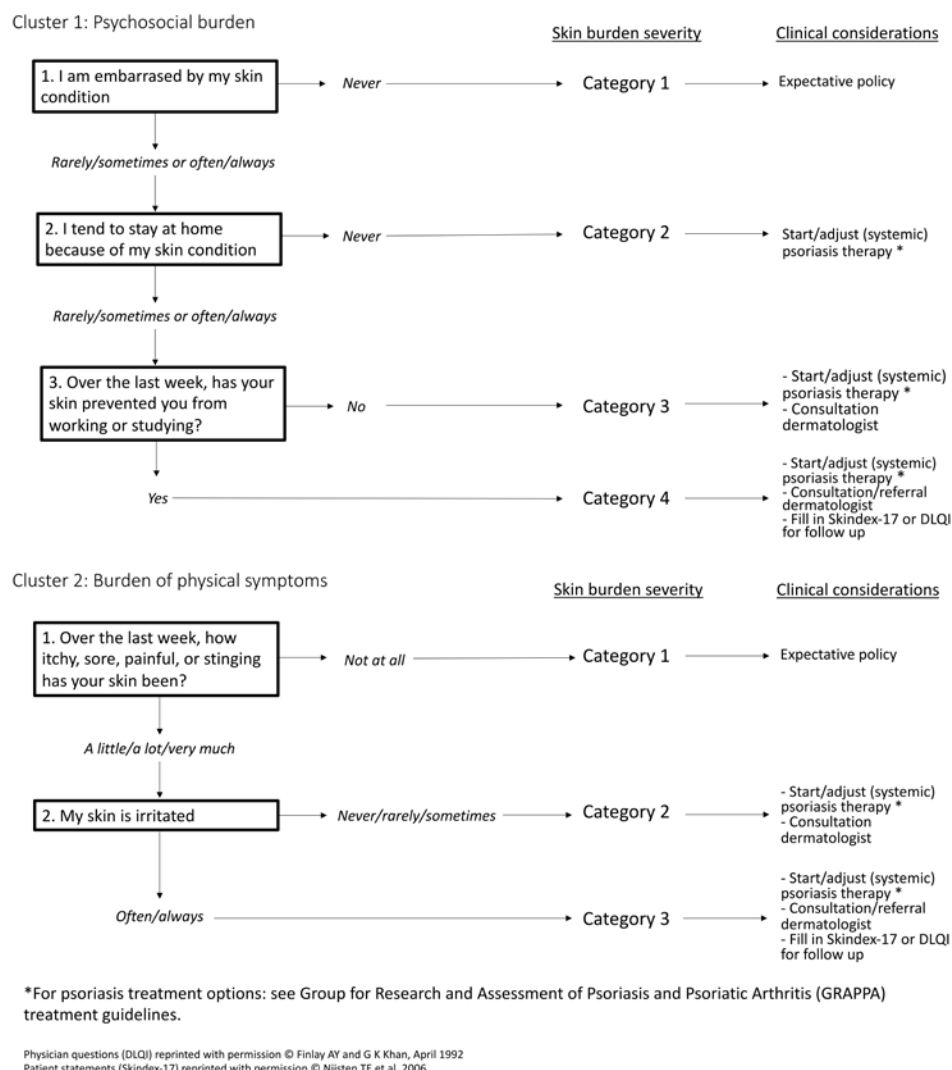
Selected questions in bold. Questions from DLQI reprinted with permission: © Dermatology Life Quality Index. AY Finlay, GK Khan, April 1992.<sup>13</sup> Questions from Skindex-17 reprinted with permission from Nijsten et al.<sup>14</sup> DLQI: Dermatology Life Quality Index.

a number of clinical considerations with increasing skin burden within the psychosocial domain. Options to consider are an expectative policy or to start/adjust (systemic) PsO therapy (Figure). PsO therapies are specified in the GRAPPA treatment guidelines and include topical therapies, phototherapy, and systemic oral therapies, such as retinoids and IL-17R or IL-23 inhibitors.<sup>16</sup> In case a patient already receives systemic therapy, consider switching therapy to a drug that also targets or better targets the skin. Besides starting or altering PsO treatment, options are to consult or refer to a dermatologist in the more complex cases (eg, in case of intertriginous or recalcitrant PsO). We recommend that rheumatologists let the group of patients who fall into the highest category of skin burden severity fill out the Skindex-17 or DLQI in order to have a tangible score that can be used for monitoring improvement in skin burden over time. The clinical considerations are similar in the cluster that assesses burden of physical symptoms. With increasing burden, rheumatologists should start/adjust (systemic) PsO therapy and consider consulting a dermatologist. In cases of complex PsO, referral to a dermatologist should be considered. We refer

rheumatologists to the full set of GRAPPA treatment guidelines for optimal choice of therapy.<sup>16</sup> In the context of shared decision making, these clinical considerations should always be discussed with the patient.

The selected questions and the sequence in which they are meant to be asked is specific to the sample of patients with PsA used in our analysis. These patients had moderate disease activity (median [IQR] Disease Activity Index for Psoriatic Arthritis score 16.0 [10.1-23.3]) and little PsO involvement (PASI score 2.0 [0.5-4.2]). The practical guide is therefore intended for use in patients with PsA who have similar patient characteristics. Because the DEPAR study includes patients in daily clinical practice without the use of diagnostic criteria or other stringent inclusion criteria, we believe our study results to be generalizable to patients with PsA seen in daily rheumatology practices elsewhere.<sup>17,18</sup>

We have developed the practical guide with baseline data from our PsA sample because at baseline we observed the maximum level of heterogeneity in PsO severity between patients. This guide performs well at baseline since the PASI, Skindex-17,



**Figure.** Flowcharts of core questions assessing skin burden in patients with psoriatic arthritis. The DLQI questions used in the flowchart are reprinted with permission [© Finlay AY and GK Khan, April 1992].<sup>13</sup> The statements from Skindex-17 used in the flowchart are reprinted with permission from Nijsten et al.<sup>14</sup> DLQI: Dermatology Life Quality Index.

and DLQI scores rise with an increasing level of skin burden severity (Table 3). Similarly, the guide performs equally well at the 12-month follow-up, with Skindex-17 and DLQI scores increasing along a rising level of skin burden severity. This shows that even though the practical guide was developed at baseline, it can also be used during the course of treatment of patients with PsA.

A strength of this study is that the vast majority of patients answered the questions in the order we used, with the same answering options we had specified. This means that when patients answered question 1 from cluster 1 with “never,” they would almost never answer question 2 with “rarely/sometimes/often/always” or question 3 with yes. At baseline, only 7% of patients could not be categorized in the psychosocial cluster, and at 12 months, this was the case in only 4% of patients. In cluster 2, there were mismatches neither at baseline nor at 12 months.

In our present study, we encountered a few challenges. First, neither the DLQI nor the Skindex-17 has been validated for use in patients with PsA. Both questionnaires have been developed in the dermatologic field and are therefore recommended for use in such patients. However, earlier research from our group has shown a positive correlation between PsO severity and dermatology-specific HRQOL, which was only mildly influenced by musculoskeletal components. Using PASI score and both subscales of the Skindex-17, we showed that the Skindex-17 questionnaire adequately measured skin burden in patients with PsA.<sup>12</sup> Second, as mentioned earlier, questions from the DLQI are posed from the perspective of the physician, whereas those from the Skindex-17 are posed as statements from the perspective of the patient. Given the methodology of the item response theory, this could not be directly altered in our guide and, therefore, we encourage rheumatologists to fully instruct patients prior to using the guide. For further development and

Table 3. Patient characteristics per category of skin burden severity at baseline (n = 413) and 12 months (n = 263).

Cluster	Category	n (%)	PASI	Skindex-17 Psychosocial	Skindex-17 Symptoms	DLQI
Baseline						
Cluster 1: Psychosocial <sup>a</sup>	1	220 (57)	0.9 (0.0-2.7)	0.0 (0.0-0.0)	2.0 (0.0-4.0)	1.0 (0.0-1.0)
	2	114 (30)	3.2 (1.2-6.6)	5.0 (3.0-8.0)	5.0 (4.0-6.0)	3.0 (1.0-5.0)
	3	40 (10)	3.8 (2.4-5.7)	12.5 (10.5-16.0)	6.0 (5.0-7.5)	6 (2.0-11.0)
	4	10 (3)	5.1 (0.8-12.3)	20.0 (18.0-21.0)	7.0 (6.0-9.0)	19.0 (14.0-23.0)
Cluster 2: Physical symptoms	1	132 (32)	0.6 (0.0-1.8)	0.0 (0.0-0.5)	1.0 (0.0-2.0)	0.0 (0.0-0.0)
	2	16 (4)	0.6 (0.15-3.1)	0.0 (0.0-0.5)	2.0 (1.0-2.5)	1.0 (1.0-2.0)
	3	265 (64)	3.0 (1.0-5.3) <sup>b</sup>	1.0 (0.0-8.0)	5.0 (4.0-7.0)	3.0 (1.0-6.0)
12 months						
Cluster 1: Psychosocial <sup>a</sup>	1	188 (74)	0.4 (0.0-1.8)	0.0 (0.0-0.0)	2.0 (0.0-4.0)	1.0 (0.0-1.0)
	2	41 (16)	2.7 (1.5-5.1)	5.0 (3.0-6.0)	4.0 (3.0-6.0)	2.0 (1.0-6.0)
	3	21 (8)	2.2 (0.6-5.8)	12.0 (10.0-13.0)	5.0 (4.0-6.0)	5.0 (3.0-9.0)
	4	3 (1)	4.3 (0.0-8.8)	21.0 (12.0-23.0)	8.0 (7.0-10.0)	22.0 (17.0-22.0)
Cluster 2: Physical symptoms	1	115 (44)	0.3 (0.0-1.5)	0.0 (0.0-0.0)	1.0 (0.0-2.0)	0.0 (0.0-0.0)
	2	16 (6)	0.3 (0.0-2.2)	0.0 (0.0-1.0)	1.0 (1.0-2.0)	1.0 (1.0-1.0)
	3	132 (50)	1.8 (0.4-3.3)	2.0 (0.0-7.0)	4.0 (3.0-6.0)	2.0 (1.0-5.0)

Values are expressed as median (IQR) unless indicated otherwise. <sup>a</sup> Patients not possible to categorize: baseline, n = 29 (7%); 12 months, n = 10 (4%). <sup>b</sup> 1 missing. DLQI: Dermatology Life Quality Index; PASI: Psoriasis Area and Severity Index.

implementation in daily practice, it would be beneficial to test the performance of the practical guide in other PsA cohorts, test it against a guide in which the phrasing of the questions is uniform, and assess its performance in comparison to other validated measures of disease impact.

To our knowledge, this is the first study to have constructed a practical guide for easy assessment of skin burden in patients with PsA. This guide offers a good starting point for rheumatologists to open the dialogue with their patients concerning skin burden. The 2 separate domains of the guide allow rheumatologists to specifically assess the type of burden in patients with PsA. Depending on the domain in which a patient scores highly, rheumatologists can discuss patient-specific therapeutic consequences, ranging from altering medication to referral to a dermatologist or other healthcare professional. Further research could focus on the evaluation of the performance of the practical guide we have developed in other observational PsA cohorts and its implementation in daily clinical practice.

In conclusion, we have created a practical guide for rheumatologists to use in daily clinical practice to easily assess skin burden in patients with PsA. This guide includes PsO-specific burden on both a psychosocial domain and physical domain. With this set of core questions, we aim to provide rheumatologists with a tool to facilitate addressing skin burden and involvement in daily consults with patients with PsA.

## ACKNOWLEDGMENT

We thank Prof. A.Y. Finlay and Cardiff University for the permission to use the DLQI questionnaire in our study and Prof. T.E.C. Nijsten for permitting use of the Skindex-17 questionnaire.

## REFERENCES

- Coates LC, Helliwell PS. Psoriatic arthritis: state of the art review. *Clin Med* 2017;17:65-70.
- Gudu T, Gossec L. Quality of life in psoriatic arthritis. *Expert Rev Clin Immunol* 2018;14:405-17.
- Wervers K, Luime JJ, Tchetverikov I, et al. Influence of disease manifestations on health-related quality of life in early psoriatic arthritis. *J Rheumatol* 2018;45:1526-31.
- Strober B, Greenberg JD, Karki C, et al. Impact of psoriasis severity on patient-reported clinical symptoms, health-related quality of life and work productivity among US patients: real-world data from the Corrona Psoriasis Registry. *BMJ Open* 2019;9: e027535.
- Merola JF, Qureshi A, Husni ME. Underdiagnosed and undertreated psoriasis: Nuances of treating psoriasis affecting the scalp, face, intertriginous areas, genitals, hands, feet, and nails. *Dermatol Ther* 2018;31:e12589.
- Dopytalska K, Sobolewski P, Blaszczyk A, Szymanska E, Walecka I. Psoriasis in special localizations. *Reumatologia* 2018;56:392-8.
- Aldredge LM, Higham RC. Manifestations and management of difficult-to-treat psoriasis. *J Dermatol Nurs Assoc* 2018; 10:189-97.
- McInnes IB, Behrens F, Mease PJ, et al; EXCEED Study Group. Secukinumab versus adalimumab for treatment of active psoriatic arthritis (EXCEED): a double-blind, parallel-group, randomised, active-controlled, phase 3b trial. *Lancet* 2020;395:1496-505.
- Mease PJ, van der Heijde D, Ritchlin CT, et al; SPIRIT-P1 Study Group. Ixekizumab, an interleukin-17A specific monoclonal antibody, for the treatment of biologic-naïve patients with active psoriatic arthritis: results from the 24-week randomised, double-blind, placebo-controlled and active (adalimumab)-controlled period of the phase III trial SPIRIT-P1. *Ann Rheum Dis* 2017;76:79-87.
- Nash P, Kirkham B, Okada M, et al; SPIRIT-P2 Study Group. Ixekizumab for the treatment of patients with active psoriatic arthritis and an inadequate response to tumour necrosis factor

- inhibitors: results from the 24-week randomised, double-blind, placebo-controlled period of the SPIRIT-P2 phase 3 trial. *Lancet* 2017;389:2317-27.
11. van Mens LJJ, Turina MC, van de Sande MGH, Nurmohamed MT, van Kuijk AWR, Baeten DLP. Residual disease activity in psoriatic arthritis: discordance between the rheumatologist's opinion and minimal disease activity measurement. *Rheumatology* 2018; 57:283-90.
  12. Kasiem FR, Kok MR, Tchetverikov I, et al. Impact of psoriasis severity on health-related quality of life in early psoriatic arthritis: results from real world data, the DEPAR study. *Ann Rheum Dis* 2020;79:1691-2.
  13. Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI)--a simple practical measure for routine clinical use. *Clin Exp Dermatol* 1994;19:210-6.
  14. Nijsten TE, Sampogna F, Chren MM, Abeni DD. Testing and reducing Skindex-29 using Rasch analysis: Skindex-17. *J Invest Dermatol* 2006;126:1244-50.
  15. Kasiem FR, Luime JJ, Vis M, et al. Lessons learned from clinical phenotypes in early psoriatic arthritis: the real-world Dutch south west Early Psoriatic ARthritis study. *Scand J Rheumatol* 2021;50:124-31.
  16. Ogdie A, Coates LC, Gladman DD. Treatment guidelines in psoriatic arthritis. *Rheumatology* 2020;59 Suppl 1:i37-46.
  17. Gladman DD, Chandran V. Observational cohort studies: lessons learnt from the University of Toronto Psoriatic Arthritis Program. *Rheumatology* 2011;50:25-31.
  18. Kalyoncu U, Bayindir O, Ferhat Oksuz M, et al; Psoriatic Arthritis Registry of Turkey Study Group. The Psoriatic Arthritis Registry of Turkey: results of a multicentre registry on 1081 patients. *Rheumatology* 2017;56:279-86.